

# Bone Cell Culturing on Surfaces Textured by Atomic Oxygen

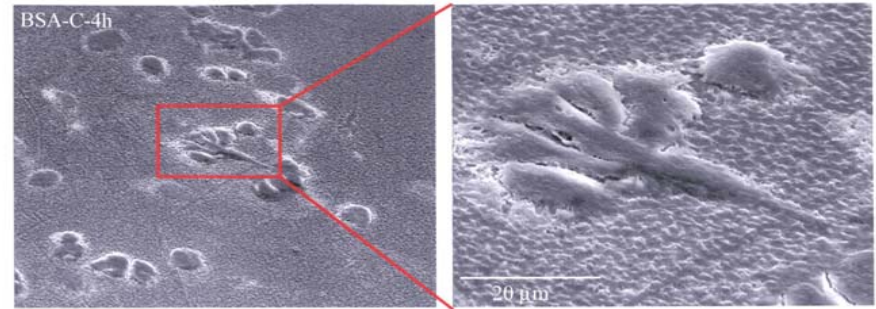


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Mata, A., Su, X., Fleischman, A.J., Roy, S., Banks, B., Miller, S., and Midura, R.J. Osteoblast Attachment to a Textured Surface in the Absence of Exogenous Adhesion Proteins. *IEEE Transactions in Nanobioscience*. 2:287-295, 2003.

## TECHNOLOGY

Through the use of atomic oxygen bombardment (AOB), it is possible to texture surfaces that will improve the tissue integration, as well as the initial cell attachment of culture dishes and orthopedic implants. A radio frequency (RF) generator is used to generate atomic oxygen plasma, which is then used to bombard the surface leaving it textured. This method allows for the texturing of surfaces at the nano/micrometer scale.



***Scanning Electron Microscope Image of Adhesion of Osteoblasts (Bone forming Cells) to Atomic Oxygen Textured Chlorotrifluoroethylene***

## COMMERCIAL APPLICATION

- ◆ Atomic oxygen bombardment will enable industry to texture surfaces that are otherwise extremely difficult to texture.
- ◆ The use of atomic oxygen bombardment of surface texturing is an exciting advancement in the cell culturing area which has previously been limited to the surfaces available for their work.
- ◆ It also offers the ability to customize surfaces through physical treatment, which is often less problematic than biological treatments and less costly.

## NASA APPLICATIONS

This atomic oxygen texturing technique can be applied by NASA in order to increase the adhesive bonding to many polymers which are normally difficult to bond, such as Teflon.

## SOCIAL / ECONOMIC BENEFIT

Plastics such as polystyrene and chlorotrifluoroethylene are materials highly suited for cell culturing because they are clear, inexpensive, and are easily injected into molds. One limitation is that they need to be chemically treated to bind adhesive proteins from serum additives in order for cells to properly adhere and grow. Texturing with atomic oxygen increases cellular adhesion without the need for serum additives. Moreover, the behavior of adherent cells on atomic oxygen textured plastic is nearly identical to that for serum treated plastic. Migration of this technology to metal scaffolds typically used to produce orthopedic prosthetic implants may also provide enhanced cellular attachment and tissue integration.

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*Date of Technology: 2003*